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PHOTOGRAPHIC INTERPRETATION REPORT

HF COMMUNICATIONS FACILITIES AT OR NEAR SOVIET ICBM COMPLEXES

April 1965

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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PREFACE

In response to numerous and overlapping requirements, a comprehensive photographic analysis has been undertaken in an effort to identify communications facilities considered to be available for use by the Strategic Rocket Forces of the USSR. Because of the scope of the entire project, the time-consuming search and measurement factors involved, and the consequent multiplicity of effort, it was not feasible to make the results of the study available in a single publication.

The present report, therefore, concerned as it is with only ICBM-related communications, is but 1 of a series of approximately 4 publications, each of which covers a convenient subunit of the larger overall project. Already published is NPIC/R-795/64, New HF Communications Facilities at Soviet MRBM/IRBM Launch Areas, August 1964; presently being prepared for publication is another report extending MRBM/IRBM coverage. A final report is anticipated to cover possibly related communications available in the Moscow area.

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FIGURE 1. LOCATION OF DEPLOYED SOVIET ICBM COMPLEXES.

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INTRODUCTION

An analysis has been made of the most recent and best [redacted] photography of all known ICBM complexes in the USSR in an effort to identify high-frequency (HF) communications and microwave facilities of the Soviet Strategic Rocket Forces. Where no communications could be identified within the general limits of the complex itself, a further search of a 50-nautical-mile (nm) surrounding area was undertaken.

25X1D Of the 24 deployed Soviet ICBM complexes known to exist as of [redacted] (Figure 1), the results of this study have revealed:

1. Communications Facilities at ICBM Complexes. A total of 6 complexes * -- Drovyanaya, Olovyannaya, Svobodnyy, Tyumen, Verkhnyaya Salda, and Yoshkar-Ola -- contained identifiable HF communications (Figures 2 - 7 and Table 1). Because of their location, these facilities are felt to be definitely associated with their respective complex.

2. Possible Communications Facilities at ICBM Complexes. Two other ICBM complexes, Kozelsk and Yedrovo, contained possible communications facilities (Figure 8).

3. Communications Facilities Within 50 nm of ICBM Complexes. At Tyumen and 2 other ICBM complexes, ** Novosibirsk and Shadrinsk, HF communications facilities were situated near the complex area but not in such proximity as to appear definitely associated. (Figures 9 - 11 and Table 2).

4. Other, Probably Unassociated, Communications Within 50 nm of ICBM Complexes. A possible communications facility was noted approximately 10 nm from the complex support facility of the Kostroma ICBM Complex, and a number of additional facilities around the city of Novosibirsk (Figure 12 and Table 3). These facilities are included in this study, however, only because they fall within the search area--they do not appear to have any pertinent relation to the ICBM complexes.

No HF or microwave communications could be identified at or within 50 nm of the remaining complexes.

For each of the identified facilities where it was both possible and relevant to do so, antenna types, numbers, orientations, and possible correspondents have been determined. The antenna azimuths are accurate [redacted] 25X1 [redacted] Size measurements are only approximate and cannot be given in many cases because pole positions could not be observed. It should also be noted that only possible correspondents are listed--these having been derived solely by extending great circles from each identified antenna, with consideration given, however, to probable range limits of the particular antenna type and the possible azimuth error. These great-circle projections are illustrated in Figures 13 and 14. 25X1

COMMUNICATIONS FACILITIES AT ICBM COMPLEXES

Of the 6 facilities covered in this section, 5 contain predominantly fishbone-type receiving antennas while the sixth has only horizontal dipole antennas. A typical HF communications facility at an ICBM complex consists of from 2 to 5 fishbone receiving antennas and 1 or 2 horizontal dipole antennas. Each of the communications facilities is situated within the ICBM complex area, generally a short distance from the complex support facility from which it probably receives its support since there are no significant support facilities within the communications facility itself.

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*An additional facility, located at the Yurya ICBM Complex and identified on [redacted] photography, is described in an addenda to this report. 25X1D

**An additional facility, located near the Itatka ICBM Complex and detected on [redacted] photography, is described in an addenda to this report. 25X1D

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The fishbone antennas, in many instances, appear to be paired--that is, 2 antennas are oriented in 1 direction, 2 more in another direction, etc. Comparison of the length of the fishbones shows it to be relatively greater as the distance from the Moscow-Leningrad area is increased, which is consistent with antenna engineering design requirements.

Yoshkar-Ola, the single facility containing only horizontal dipole antennas, is much nearer to Moscow than the other facilities, which may account for the presence of only this relatively short-range type antenna.

No rhombic antennas are found at any of these facilities, indicating either that, if present, this type of antenna is older and cannot be seen because of vegetation growth or that, if not present, there exists no capability for long-range HF transmitting directly from the ICBM complex.

For each of the facilities in this section, there is a brief description together with a photograph and a line drawing. Pertinent data on the individual antennas, including orientation, has been collected in Table 1. The great-circle projections of the antennas are illustrated in Figure 13.

DROVYANAYA ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 2) is situated approximately 1.5 nm east-southeast of the complex support facility of the Drovyanaya ICBM Complex, and generally to the north of the individual launch areas. The facility, which is relatively new, contains 2 HF fishbone receiving antennas (items 1 and 2), each having 5 rows of pole positions, and a control building and guardhouse. As discussed earlier in this report, the 2 antennas are paired, i.e., their size and orientation is similar. Most of the pole and guy-anchor positions of the antennas can be seen on the photography, but no pole shadows are visible. (The only facility where actual pole shadows can be observed is the one at Verkhnyaya Salda, for which good-quality large-scale photography is available.)

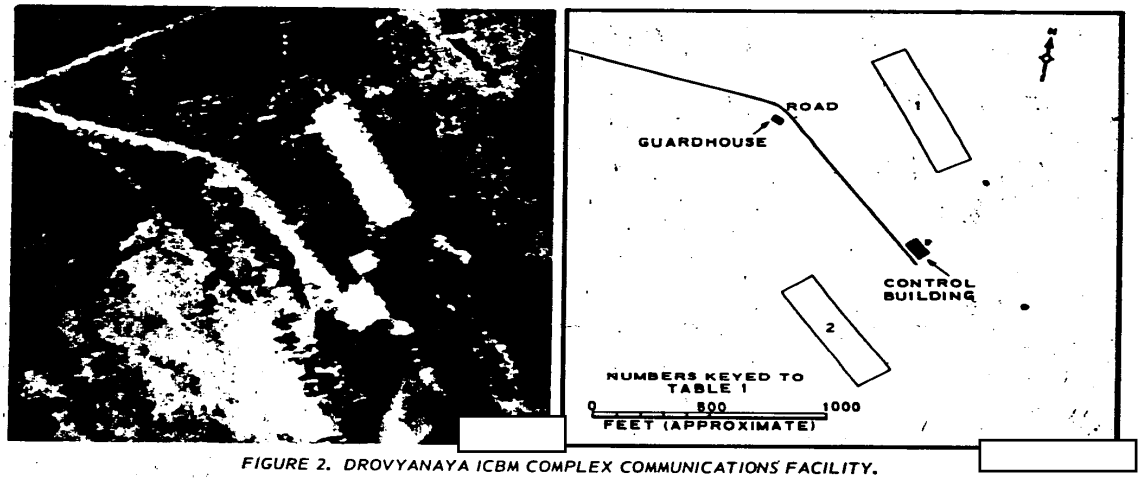

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FIGURE 2. DROVYANAYA ICBM COMPLEX COMMUNICATIONS FACILITY.

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OLOVYANNAYA ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 3) is situated approximately 2.5 nm north of the complex support facility of the Olovyannaya ICBM Complex, and generally to the south of the individual launch areas. The fence-secured facility contains 4 HF fishbone receiving antennas (items 1 to 4), a horizontal dipole antenna (item 5), and a possible antenna of an unidentified type (item 6). A small control/support area includes a single control building and several construction/support buildings.

The fishbone antennas have 5 rows of pole positions each and are still under construction; 2 of the 4 are paired (items 1 and 2). The possible antenna is not distinct enough on the available photography for azimuthal or other measurements.

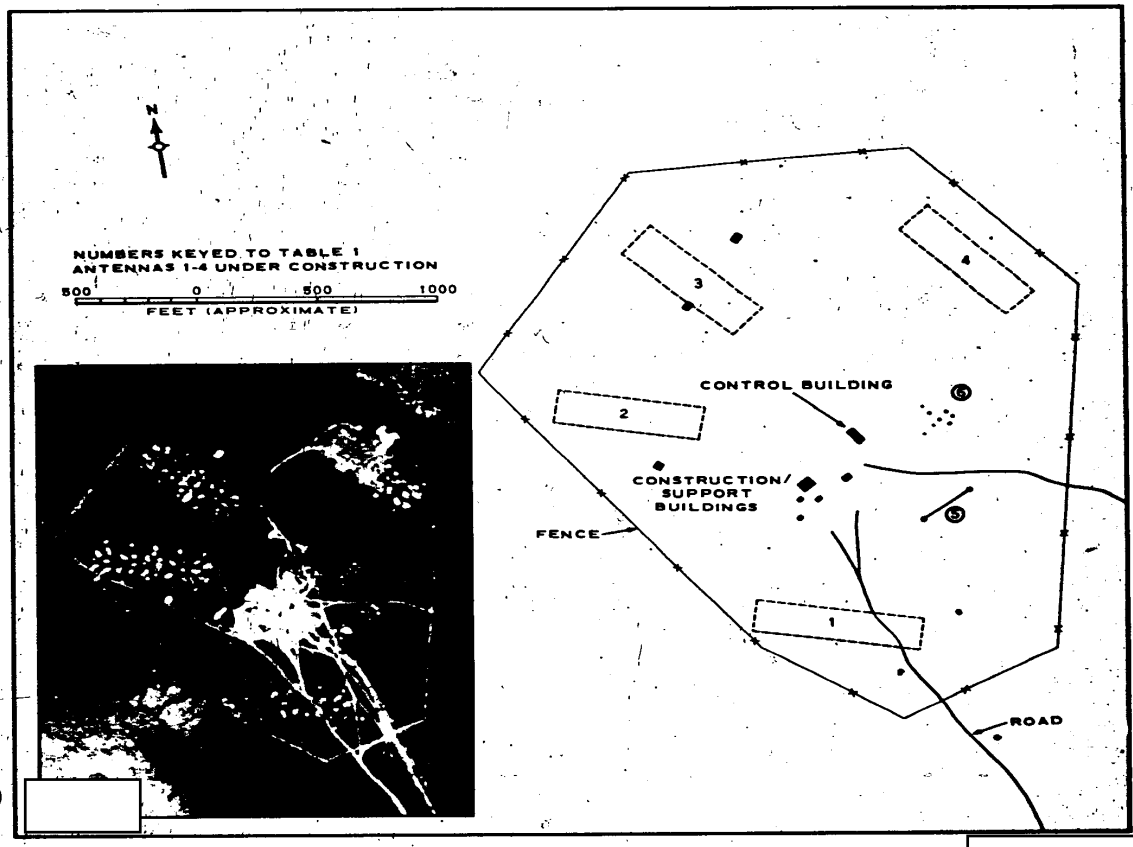

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FIGURE 3. OLOVYANNAYA ICBM COMPLEX COMMUNICATIONS FACILITY.

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SVOBODNYY ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 4) is situated approximately 2.5 nm north-northeast of the complex support facility of the Svobodnyy ICBM Complex and is generally centered among the individual launch areas. The fence-enclosed facility has an antenna field containing 5 HF fishbone receiving antennas (items 1 to 5), a horizontal dipole antenna (item 6), and a possible antenna of unidentified type (item 7). A control area contains a single control building and 2 other small buildings; on the photography of [redacted] 4 probable vehicles were observed in this area. In addition, there is a guard shack at the entrance and a probable construction building at the end of antenna No 1.

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Size measurements for the fishbones were very difficult to determine as the antennas are still under construction and the guy anchors and pole positions are very indistinct. However, 4 of these antennas appear to be approximately the same size as those at the Olovyannaya and Drovyanaya facilities, and their orientations indicate that they constitute 2 pairs. The fifth fishbone appears shorter than the others and is probably intended for receiving from a correspondingly lesser distance. The orientation of the horizontal dipole is the same as that of the small fishbone. The possible antenna is very indistinct on the available photography and no azimuthal or other measurements could be obtained.

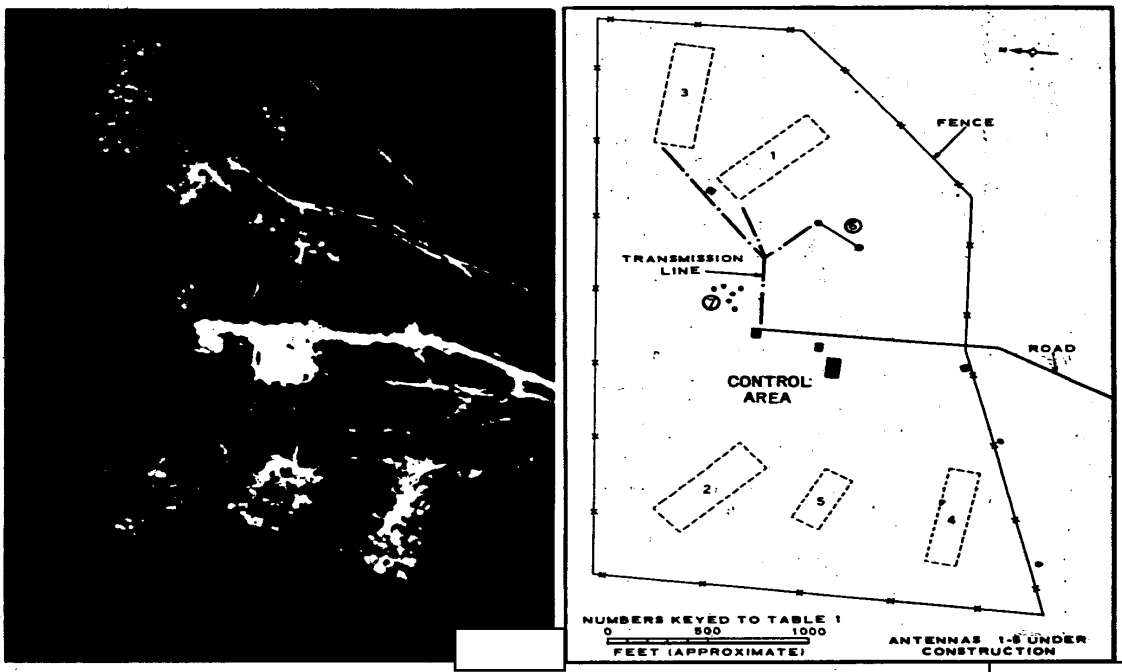

FIGURE 4. SVOBODNYY ICBM COMPLEX COMMUNICATIONS FACILITY.

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TYUMEN ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 5) is situated 2 nm west of Bogandinskaya and adjacent to the unidentified facility just north of the complex support facility of the Tyumen ICBM Complex. The facility contains 2 paired HF fishbone receiving antennas (items 1 and 2), a horizontal dipole antenna (item 3), and a possible antenna of an unidentified type (item 4). A probable future control area contains no buildings as yet but has been partially cleared and some footings may be present.

The fishbones, which have an apparent 2-2-2 configuration, are relatively short, indicating a receiving-distance capability less than that of the fishbones at Svobodnyy, Drovyanaya, and Olovyannaya. No meaningful azimuthal or other measurements could be obtained for the possible antenna on available photography.

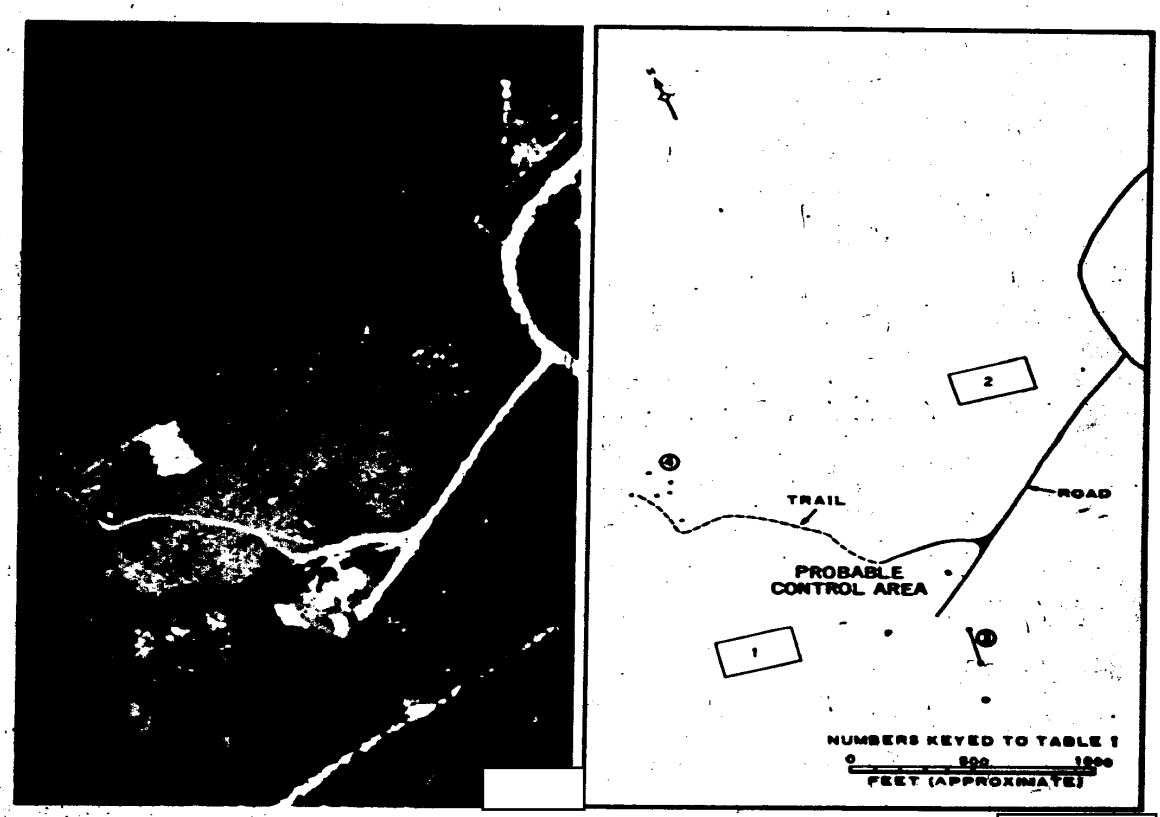

FIGURE 5. TYUMEN ICBM COMPLEX COMMUNICATIONS FACILITY.

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VERKHNYAYA SALDA ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 6) is situated 8 nm north-northeast of Verkhnyaya Salda at the auxiliary support facility of the ICBM complex. The facility consists of a pair of fishbone receiving antennas (items 1 and 2), 5-3-3-5 configuration, and a control/support area. As mentioned previously, the shadows of the antenna poles can be seen at this facility because of the large scale and good quality of the photography. The control/support area contains 6 large buildings, 1 of which is a probable control building, and 2 smaller buildings/structures. A possible transmission line extends from 1 of the fishbones to the probable control building, adjacent to which are 2 or 3 possible communications masts of no identifiable configuration (item 3). 25X1

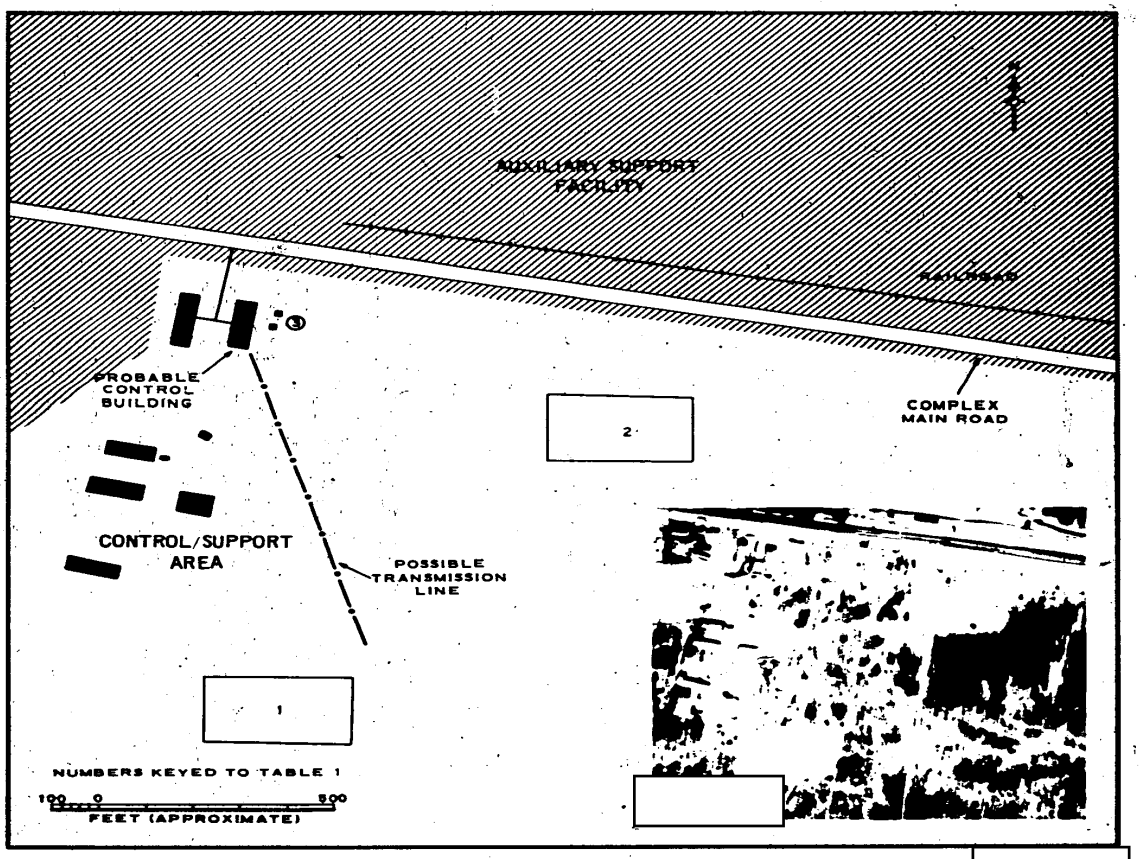

FIGURE 6. VERKHNYAYA SALDA ICBM COMPLEX COMMUNICATIONS FACILITY. [redacted] 25

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[redacted]

[redacted] 25X1

YOSHKAR-OLA ICBM COMPLEX COMMUNICATIONS FACILITY

An HF communications facility (Figure 7) is situated approximately 2 nm northeast of the complex support facility of the Yoshkar-Ola ICBM Complex, and generally to the west of the individual launch areas. This facility differs markedly from the previous 5 communications facilities in that it contains no identifiable fish-bone antennas; instead, there are 3 probable horizontal dipole antennas (items 1 to 3) and 1 possible horizontal dipole antenna (item 4). The control area is indistinct but appears to contain a single building and 2 small unidentified objects. Neither antenna poles nor guy-anchor positions are clearly discernible on the available photography, the presence of the antennas being inferred by the patterns cut in the vegetation.

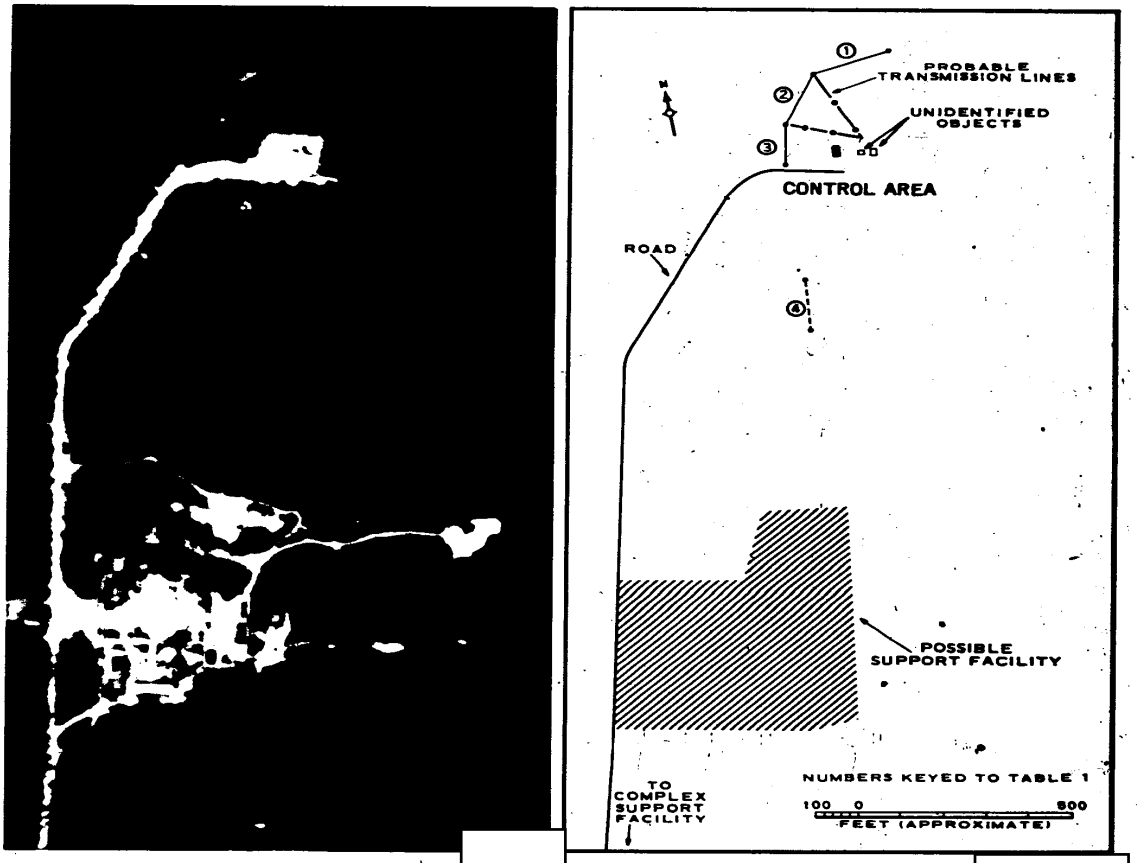

FIGURE 7. YOSHKAR-OLA ICBM COMPLEX COMMUNICATIONS FACILITY.

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Table 1. HF Communications Facilities at ICBM Complexes.

Location			Antennas						Photography					
Associated ICBM Complex	Distance from Complex Support Facility (nm, approx)	Coordinates	Item Number (keyed to appropriate figure)	Type	Length (ft, approx)	Width (ft, approx)	Azimuth	Possible Correspondents (see Figure 13)	Mission	Date	Pass	Camera Frame	X - Y	Map Reference* (sheet number)
Dvoyannaya	1.5 ESE	51-31-20N 113-03-30E	1	Fishbone	650	150		Salekhard, Arkhangelsk areas						0201-4HL
			2	Fishbone	650	150		Salekhard, Arkhangelsk areas						
Olovyannaya	2.5 North	50-52-30N 115-49-00E	1	Fishbone	625	190		Karaganda, Tyuratam, Baku areas						0202-6HL
			2	Fishbone	625	190		Karaganda, Tyuratam, Baku areas						
			3	Fishbone	[redacted]	170		Leningrad area						
		25X1D	4	Fishbone	--	--		Salekhard, Arkhangelsk areas						
			5	Dipole	205	NA		Kirensk area						
Svobodnyy	2.5 NNE	51-48-20N 128-10-00E	1	Fishbone	--	--		Moscow area						0203-3HL
			2	Fishbone	--	--		Moscow area						
			3	Fishbone	620	170		Dvoryanaya ICBM Complex, Alma-Ata areas/Komsomolsk area						
			4	Fishbone	--	--		Dvoryanaya ICBM Complex, Alma-Ata areas/Komsomolsk area						
			5	Fishbone	--	--		Bratsk, Krasnoyarsk (Gladkaya ICBM Complex), Novosibirsk areas/S Sakhalin Is						
			6	Dipole	220	NA		S Sakhalin Is						
Tyumen	2 North	56-54-00N 65-49-40E	1	Fishbone	315	195		Moscow area						0156-20HL
			2	Fishbone	315	195		Moscow area						
			3	Dipole	130	NA		Yoshkar-Ola ICBM Complex area/Novosibirsk ICBM Complex area						
Verkhnyaya Salda	15 NE (at auxiliary support facility)	58-12-40N 60-42-00E	1	Fishbone	315	170		Moscow area						0136-15HL
			2	Fishbone	315	170		Moscow area						
Yoshkar-Ola	2 NE	56-35-00N 48-04-00E	1	Dipole (prob)	--	NA		Kuybyshev, Gupyev areas						0155-22HL
			2	Dipole (prob)	--	NA		Undetermined						
			3	Dipole (prob)	--	NA		Yedrovo ICBM Complex area						
			4	Dipole (poss)	--	NA		Moscow area						

25X1D

*Map reference is to US Air Target Chart, Series 200 (scale 1:200,000).

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POSSIBLE COMMUNICATIONS FACILITIES AT ICBM COMPLEXES

In addition to the 6 facilities already described, there are possible communications facilities at 2 other ICBM complexes, Kozelsk and Yedrovo (Figure 8).

Kozelsk ICBM Complex Possible Microwave Tower.

25X1D

Map: DIA. US Air Target Chart, Series 200, Sheet 0167-14HL, 2d ed, Nov 63, scale 1:200,000 (S)

The only possible communications-related facility that could be identified at the Kozelsk ICBM Complex is a possible microwave tower of the self-supporting lattice type situated in a clearing at 53-57-00N 35-48-30E, immediately west-northwest of the complex support facility. Although no microwave dishes, reflectors, or horn-and-lens equipment can be seen, the scale of the photography precludes the complete discounting of their presence.

Yedrovo ICBM Complex Possible Communications Facility.

25X1D

Map: DIA. US Air Target Chart, Series 200, Sheet 0154-11HL, 3d ed, Nov 63, scale 1:200,000 (S)

This possible facility is at 57-49-30N 33-43-40E, 2.5 nm southeast of the complex support facility of the Yedrovo ICBM Complex. It consists of a probable antenna field (no antennas are identifiable), a centrally located probable control building, and a small support area containing 5 buildings and 3 unidentified objects.

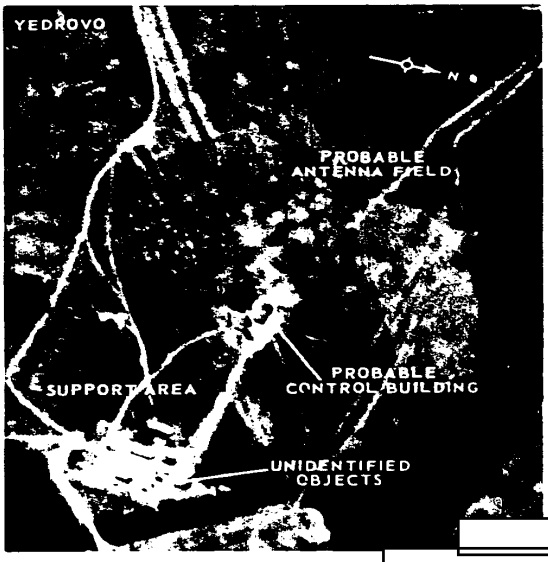

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FIGURE 8. POSSIBLE COMMUNICATIONS FACILITIES AT KOZELSK AND YEDROVO ICBM COMPLEXES.

57-33

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COMMUNICATIONS FACILITIES WITHIN 50 NM OF ICBM COMPLEXES

At 3 ICBM complexes,* Novosibirsk, Shadrinsk, and Tyumen (which also has an HF communications facility, previously described, within the general area of the complex), communications facilities have been identified within a relatively short distance of the complex but still far enough away so that it is not possible to definitely associate them with the complex. These 3 facilities are not particularly similar to the 6 ICBM complex facilities that have already been covered. For example, 2 of these 3 facilities contain primarily rhombic antennas, a type not found at the other 6. Also, although the third facility does contain HF fishbone antennas, these are all individually oriented (i.e., not paired) and, a further difference, there are no identifiable horizontal dipoles present. Nevertheless, these 3 facilities have sufficient possible relevance so that a brief description, line drawing, and photograph of each is included in this report. In addition, Table 2 lists the orientations, possible correspondents, and obtainable measurements for each antenna, and Figure 14 shows the great-circle projections.

*An additional facility, located near the Itatka ICBM Complex and detected on [redacted] photography, is described in an addenda to this report.

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Communications Facility East of the Novosibirsk ICBM Complex

An HF communications receiving facility (Figure 9) is situated 18 nm northeast of Novosibirsk and 9.5 nm east of the complex support facility of the Novosibirsk ICBM Complex. This fence-secured facility consists of 5 fishbone receiving antennas (items 1 to 5) and a control/support area. As noted above, the fishbones at this facility are not paired, a common practice at many of the other facilities, but are individually oriented instead. These antennas are indistinct on the available photography, so that the measurement of their lengths and widths is very approximate. The control/support area contains 5 large buildings (including a control building) and 8 small buildings. An additional small group of buildings is immediately adjacent to and outside of the southeastern fence line.

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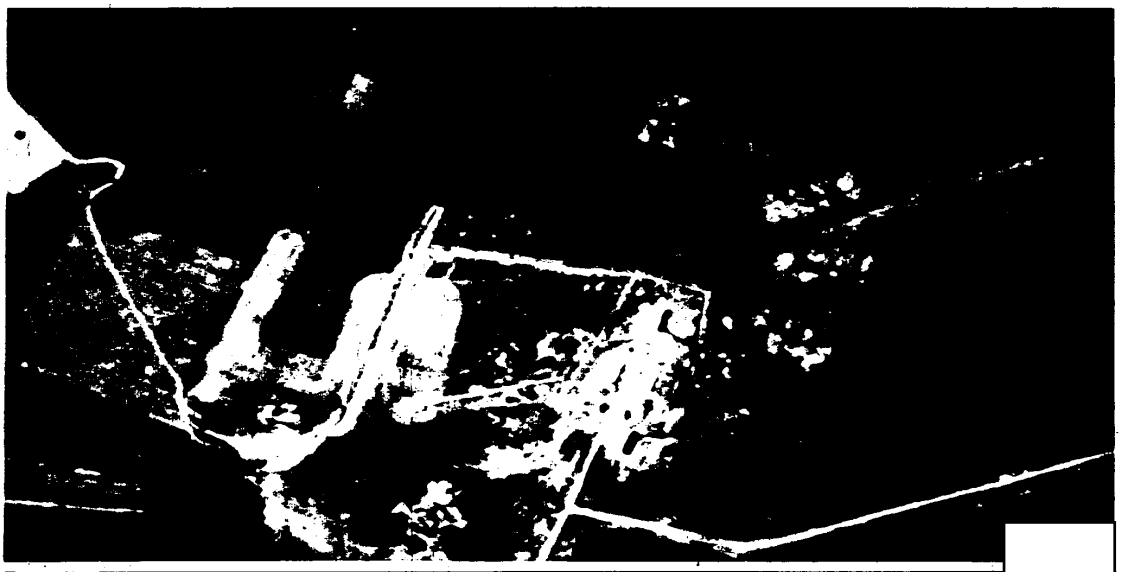

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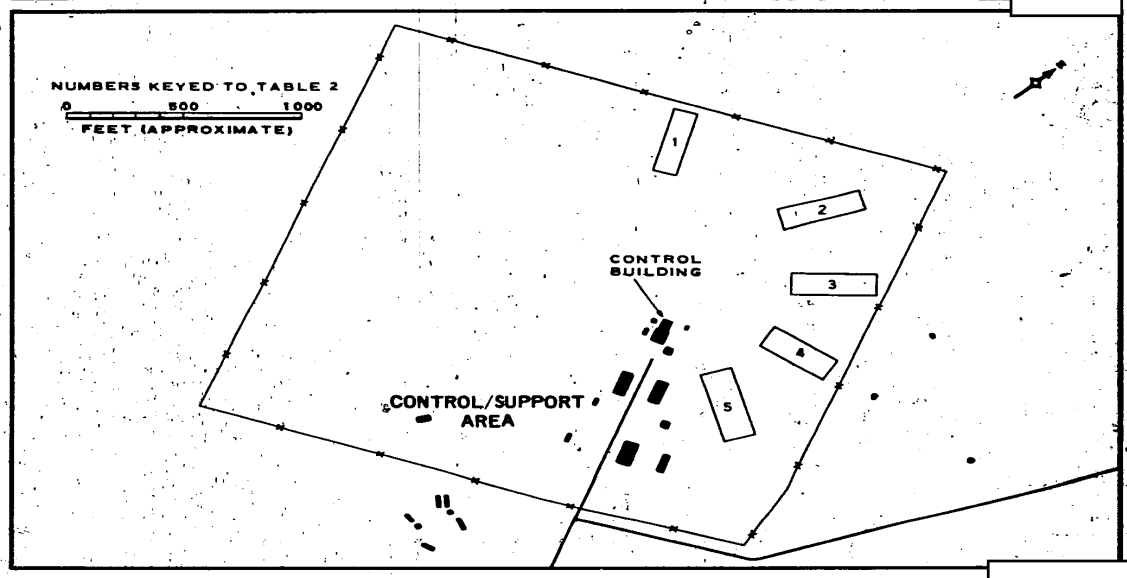

FIGURE 9. COMMUNICATIONS FACILITY EAST OF NOVOSIBIRSK ICBM COMPLEX.

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[redacted]

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Communications Facility West of the Shadrinsk ICBM Complex

An HF communications facility (Figure 10) is situated 6.5 nm east-southeast of Dalmatovo and 19.5 nm west-northwest of the complex support facility of the Shadrinsk ICBM Complex. Antennas at the facility include 2 double rhombics arranged as a day-night pair (items 1 and 2) and a row of probable HF horizontal dipoles (item 3), the exact number of which cannot be determined on the available photography. Two possible antennas of an unidentified type (items 4 and 5) are situated near the rhombics, but no meaningful measurements are possible for these. In addition to the antennas, the facility contains a centrally located control building and a small support area with at least 2 buildings and clearings for possible additional construction.

25X1

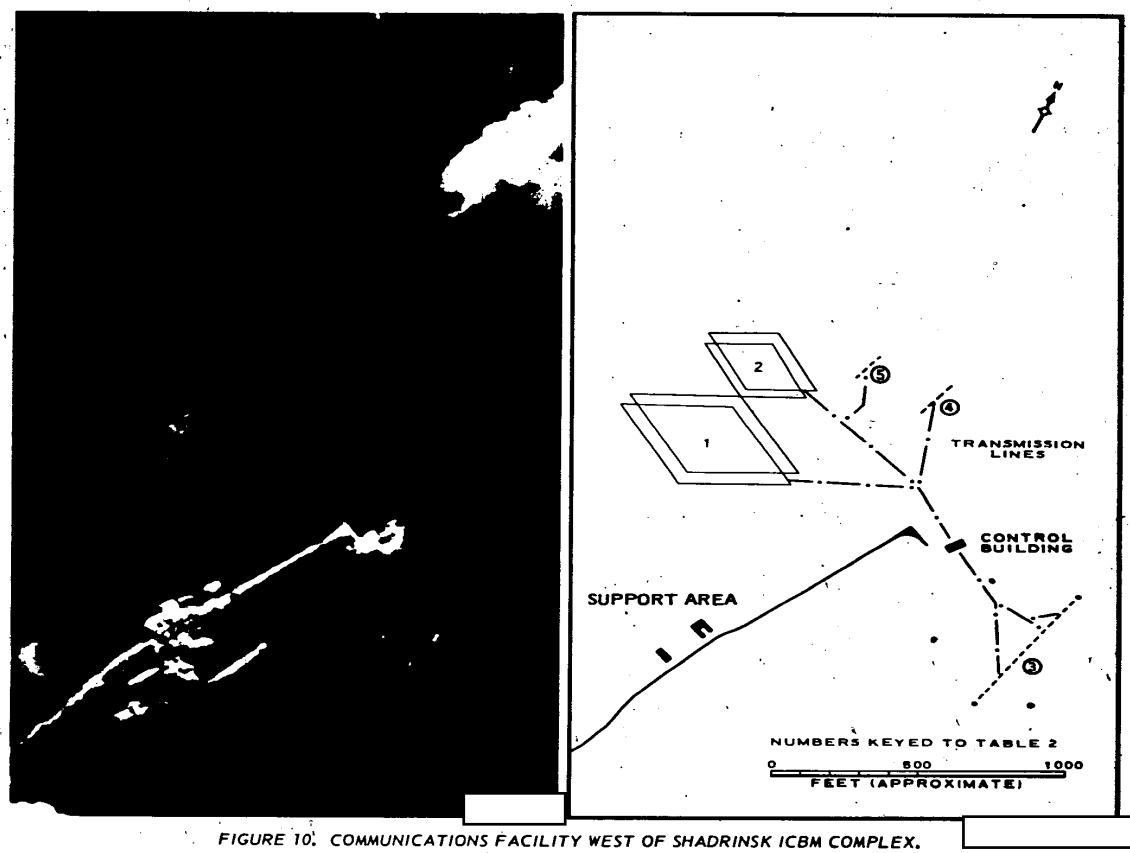

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FIGURE 10. COMMUNICATIONS FACILITY WEST OF SHADRINSK ICBM COMPLEX.

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Communications Facility North of the Tyumen ICBM Complex

An HF communications facility (Figure 11) is 8 nm southeast of Tyumen and 13 nm north-northwest of the complex support facility of the Tyumen ICBM Complex. The fence-enclosed facility contains 2 double day and 2 double night HF rhombic antennas (items 1 to 4), all of which appear to be oriented to the same azimuth. In addition, 3 horizontal dipole antennas (items 5 and 6) can be identified by their pole and guy-anchor positions. The facility also contains a small tower of unidentified function (item 7) and a single control building.

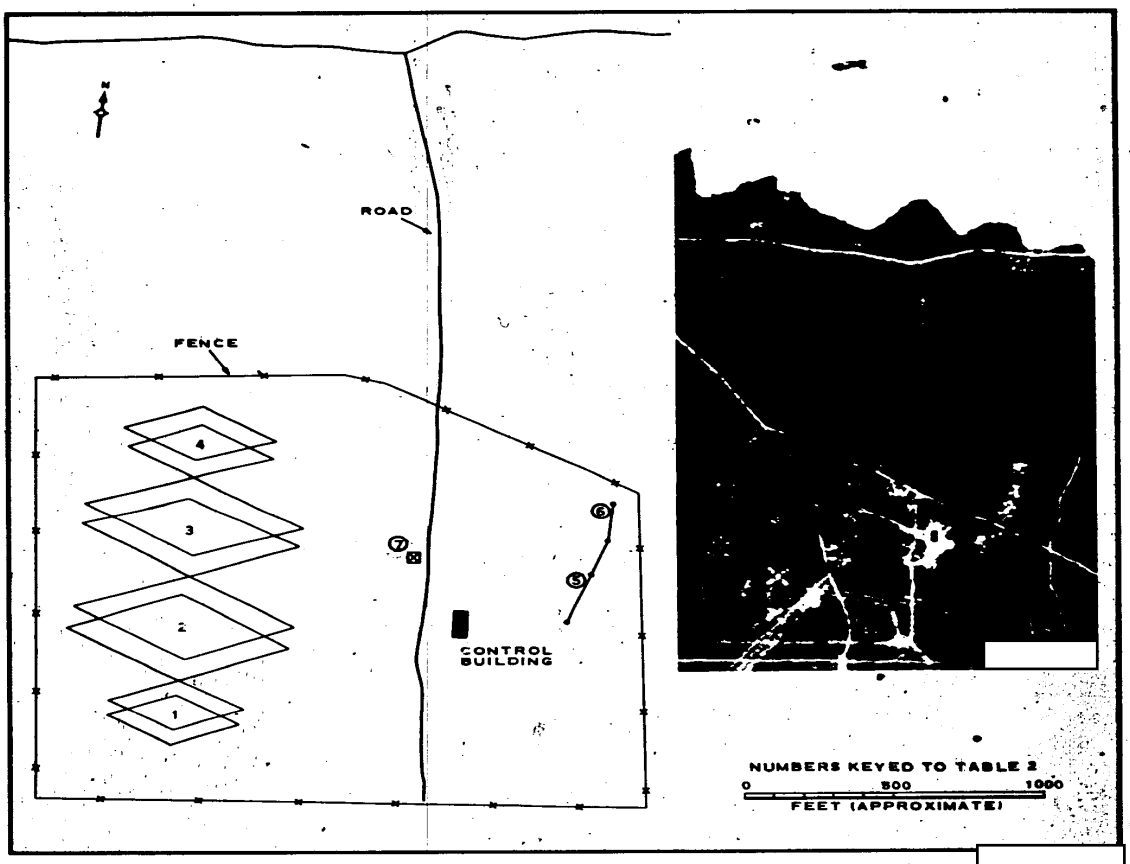

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FIGURE 11. COMMUNICATIONS FACILITY NORTH OF TYUMEN ICBM COMPLEX.

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Table 2. HF Communications Facilities Near ICBM Complexes

Location			Antennas						Photography					
Nearest ICBM Complex	Distance from Complex Support Facility (nm, approx)	Coordinates	Item Number (keyed to appropriate figure)	Type	Length (ft, approx)	Width (ft, approx)	Azimuth	Possible Correspondents (see Figure 14)	Mission	Date	Pass	Camera Frame	X - Y	Map Reference* (sheet number)
Novosibirsk	9.5 East	55-14-30N 83-18-00E	1	Fishbone	350	130		Salekhard area						0162-5HL
			2	Fishbone	350	130		Alma-Ata area						
			3	Fishbone	350	130		Ashkhabad area Yeniseysk area						
			4	Fishbone	350	130		Guryev area Krasnoyarsk (Gladkaya ICBM Complex), Svobodnyy areas						
			5	Fishbone	350	130		Yedrovo, Yurya ICBM Complexes						
Shadrinsk	19.5 WNW	56-14-00N 63-07-30E	1	Double night rhombic	670	375		S of Gorkiy; Kozelsk ICBM Complex area						0156-24HL
			2	Double day rhombic	400	255		S of Gorkiy; Kozelsk ICBM Complex area						
			3	Dipoles (prob)	--	NA		Sverdlovsk area Omsk area						
Tyumen	15 NNW	57-05-00N 65-45-00E	1	Double day rhombic	420	280		S of Gorkiy, Moscow; Kozelsk ICBM Complex						0156-20HL
			2	Double night rhombic	735	450		S of Gorkiy, Moscow; Kozelsk ICBM Complex						
			3	Double night rhombic	735	450		S of Gorkiy, Moscow; Kozelsk ICBM Complex						
			4	Double day rhombic	--	--		S of Gorkiy, Moscow; Kozelsk ICBM Complex						
			5	Dipoles (2)	375 (total)	NA		Verkhnyaya Salda ICBM Complex area Omsk area						
			6	Dipole	165	NA		Novosibirsk area						

*Map reference is to US Air Target Chart, Series 200 (scale 1:200,000).

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25X

OTHER, PROBABLY UNASSOCIATED, COMMUNICATIONS FACILITIES WITHIN 50 NM OF ICBM COMPLEXES

Novosibirsk Area Communications Facilities. A search of the area in and around Novosibirsk revealed, in addition to the fishbone communications facility described in the preceeding section, a number of other definite or possible communications facilities, most of which have been known for a number of years.1/ No association can be established through photographic analysis between these facilities and the Novosibirsk ICBM Complex. For this reason, individual descriptions or illustrations are omitted and brief mention of the facilities is included in this study only because they happen to fall within the scope of the request and because no specifically related communications facilities could be identified at the Novosibirsk ICBM Complex.

Figure 12 locates these facilities and Table 3 gives a summary listing of them, indicating the number, type, and orientation of their antennas as noted on recent small-scale photography of the area. No attempt has been made to determine individual antenna correspondents or to develop other detailed technical information.

Kostroma Area Possible Communications Facility.

25X1D [redacted]

Map: DIA. US Air Target Chart, Series 200, Sheet 0154-14HL, 3d ed, Apr 63, scale 1:200,000 (S)

A possible communications facility (not illustrated) was noted at 57-44-00N 41-01-30E, 3.5 nm southeast of Kostroma and 10 nm southwest of the complex support facility of the Kostroma ICBM Complex. It is included in this study only because, as in the case of Novosibirsk, no communications could be identified at the complex itself.

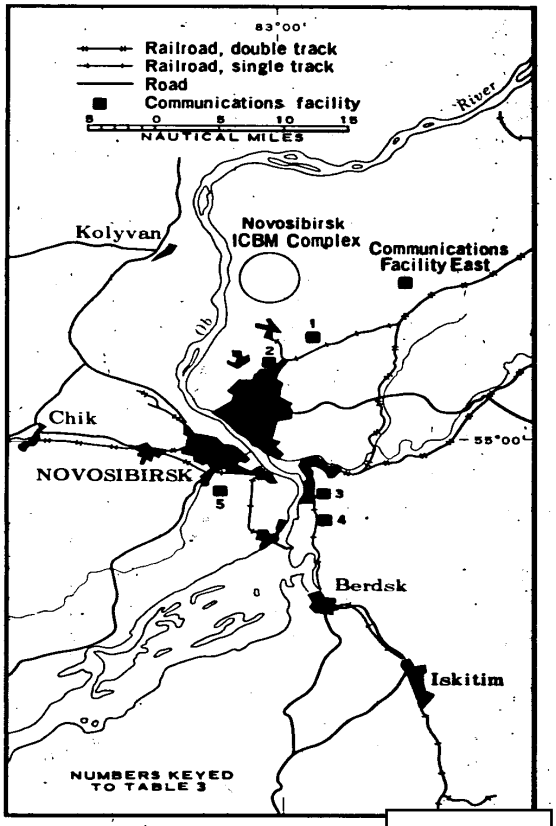

FIGURE 12. LOCATION OF NOVOSIBIRSK AREA COMMUNICATIONS FACILITIES.

The possible facility is indistinct on the available photography. However, it appears to contain a possible horizontal dipole antenna, indicated by pole and guy-anchor positions. This single possible antenna is approximately 155 feet long and is probably oriented on an azimuth of

[redacted] 25X1D 25X1

[redacted]

TOP SECRET

Table 3. Additional Communications Facilities in the Novosibirsk Area
(Item numbers keyed to Figure 12)

Item Number	Description	Distance from Novosibirsk (nm, approx)	Photographic Coordinates* Camera/Frame X - Y	Number and Type of Antennas	Antenna Orientation
1	Possible communications facility	10 NE	[redacted]	Undetermined (scattered apparent guy-anchor positions)	[redacted]
2	Communications facility	6 NNE		4 double night rhombics 6 double day rhombics 4 prob double night rhombics 1 prob double day rhombic 1 prob single rhombic 1 prob horizontal dipole 1 prob V	
3	Communications facility	9 SE		1 fishbone (L-630', W-185')	
4	Probable communications facility	10 SE		Undetermined (no masts or guy-anchor positions visible)	
5	Communications/ directional broadcast facility	7 S		1 day-night HF serpentine curtain array 3 prob V	

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**Details on this array can be obtained from Reference 1.

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[redacted]

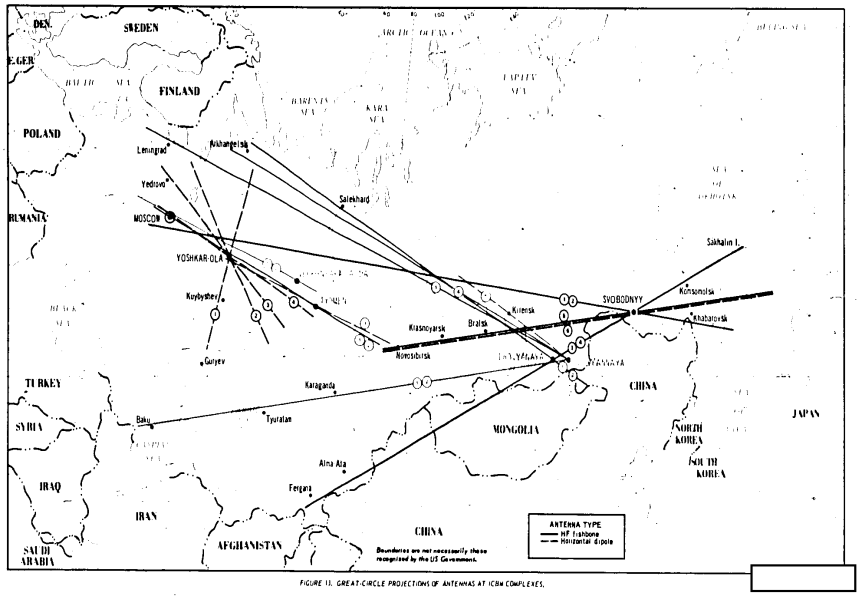

FIGURE 11. GREAT-CIRCLE PROJECTIONS OF ANTENNAS AT ICBM COMPLEXES.

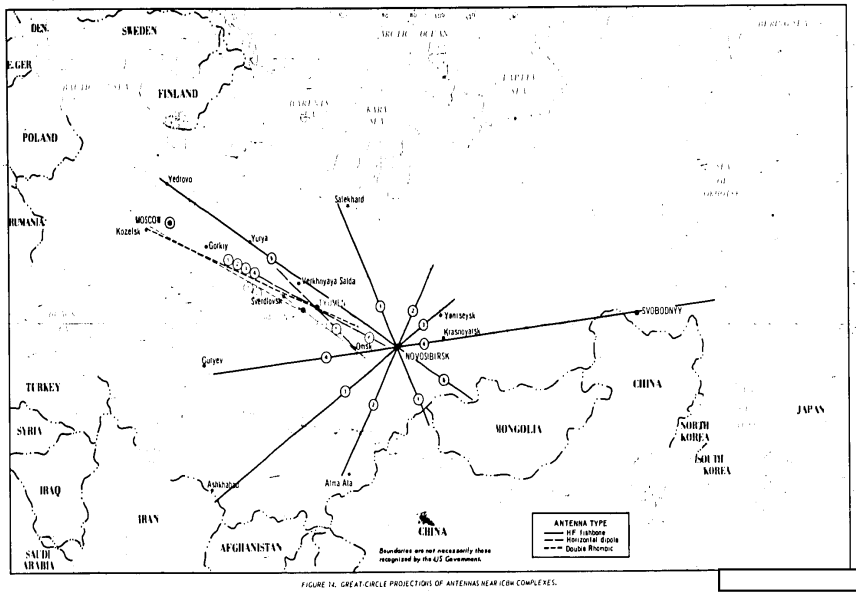

FIGURE 14. GREAT-CIRCLE PROJECTIONS OF ANTENNAS NEAR ICBM COMPLEXES.

[redacted] 25X1

25X1D

ADDENDA

Yurya ICBM Complex Communications Facility

[redacted]

Map: DIA. US Air Target Chart, Series 200, Sheet 0155-8HL, 4th ed, Sep 63, scale 1:200,000 (S)

25X1D An HF communications facility, newly identified on photography from [redacted] is situated at 59-06-00N 49-18-00E, 1.5 nm from the complex support facility of the Yurya ICBM Complex.

The facility contains 4 HF horizontal dipole antennas, 1 or 2 possible antennas of an unidentifiable type, and a control area containing 6 buildings. A rough computation of the orientations of the antennas indicates them to be approximately 245 degrees (probable correspondent: Moscow) and 315 degrees (possible correspondent: Plesetsk).

Communications Facility Southwest of the Itatka ICBM Complex

25X1D

[redacted]

Map: DIA. US Air Target Chart, Series 200, Sheet 0158-24HL, 2d ed, Jan 64, scale 1:200,000 (S)

Continuing analysis of photography from [redacted] has revealed a newly identified HF communications facility at 56-44-00N 85-21-20E, 9.8 nm southwest of the complex support facility of the Itatka ICBM Complex. 25X1D

The facility contains 2 HF rhombic antennas arranged as a day-night pair (approximate orientation 285 degrees; probable correspondent: Moscow), 1 definite and 2 probable vee antennas, and an antenna of an unidentifiable type. In addition, the facility contains a central control building and approximately 12 support buildings.

REFERENCES

DOCUMENT

25X1C

[redacted]

RELATED DOCUMENT

NPIC. R-795/64, *New HF Communications Facilities at Soviet MRBM/IRBM Launch Areas*, Aug 64 (TOP SECRET [redacted] 25X1

REQUIREMENTS

CIA. C-RR4-61,798

[redacted]

NPIC PROJECTS

11754/64 (partial answer)

12012/64

[redacted] 25X1